

5 What is claimed is:

1. A device for implantation in a mammal which serves as a template to form in vivo a functional replacement body part comprising plural distinct tissues, the device comprising:

10 a) a biocompatible, biodegradable matrix

defining a structure which allows the attachment of infiltrating cells,

comprising residues having specificity for, or derived from, said plural distinct tissues; and,

15 having dimensions and shape which mimic that of the body part to be replaced; and disposed on the surface of said matrix,

20 b) an osteogenic protein in an amount sufficient to induce formation of new said plural distinct tissues thereby to permit regeneration of tissues corresponding in shape and kind to said residues within a mammal.

2. The device of claim 1 wherein one of said plural distinct replacement tissues is a non-mineralized tissue.

3. The device of claim 1 wherein said matrix comprises devitalized tissue from a mammalian donor.

4. The device of claim 1 wherein said matrix comprises residues of articular cartilage and of bone.

5. The device of claim 1 wherein said matrix comprises at least a portion of a skeletal joint.

6. The device of claim 1 or 5 wherein the matrix comprises dehydrated mammalian tissue.

- 35 7. The device of claim 2 wherein said replacement non-mineralized tissue is selected from the group consisting of articular cartilage, ligament, tendon, synovial capsule and synovial membrane tissue.

- 40 8. The device of claim 5 wherein said skeletal joint defines a synovial or articulating joint.

5 9. The device of claim 5 or 8 wherein said device defines a devitalized intact skeletal joint structure.

10. A device for implantation in a mammal forming in vivo articular cartilage replacement tissue in a skeletal joint, the device comprising:

10 osteogenic protein disposed on the surface of a biocompatible, bioresorbable matrix

said matrix defining a structure which allows the attachment of infiltrating cells and which comprises residues specific for, or derived from, articular cartilage tissue.

15 11. A device for implantation in a mammal for forming in vivo replacement non-mineralized tissue in a skeletal joint, the device comprising:

20 osteogenic protein disposed on the surface of a biocompatible, bioresorbable matrix,

said matrix defining a structure which allows the attachment of infiltrating cells and which comprises residues specific for, or derived from, non-mineralized skeletal joint tissue corresponding in kind to said tissue to be replaced.

25 12. The device of claim 11 wherein said non-mineralized tissue is an avascular tissue.

13. The device of claim 10 wherein said non-mineralized tissue is selected from the group consisting of articular cartilage, ligament, synovial membrane and synovial capsule tissue.

30 14. The device of claim 10 or 11 wherein said matrix comprises devitalized allogenic or xenogenic tissue.

15. The device of claim 10 or 11 wherein said matrix comprises a material selected from the group consisting of: collagen, polymers comprising monomers of lactic acid, glycolic acid, butyric acid and combinations thereof, hydroxyapatite, tricalcium phosphate, and mixtures thereof.

35 16. The device of claim 10 or 11 further comprising a material suitable for binding particulate matter to form a moldable solid.

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17. The device of claim 1, 10 or 11 wherein said osteogenic protein comprises homodimers or heterodimers of OP-1, OP-2, BMP2, BMP3, BMP4, BMP5, BMP6, OPX, or functional equivalents thereof.

10 18. A method for inducing in a mammal the formation of an autologous replacement body part comprising plural distinct tissues, said method comprising the steps of:

a) providing a device comprising osteogenic protein disposed on the surface of a bioresorbable, biocompatible matrix, said matrix

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defining a structure which allows the attachment of infiltrating cells,

comprising residues having specificity for, or derived from, said plural distinct tissues, and

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having dimensions and shape which mimic that of the body part to be replaced; and

b) implanting said device at a locus in a mammal, thereby to induce formation of tissues corresponding in shape and kind to said residues.

25 19. The method of claim 18 wherein said locus in said mammal defines an endogenous body part to be replaced.

20. The method of claim 18 wherein said matrix further comprises residues which are dimensioned to correspond in shape and structural relation to said plural distinct tissues to be replaced.

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21. The method of claim 18 wherein the plural distinct tissues comprise bone and cartilage.

22. The method of claim 18 wherein said matrix comprises devitalized allogenic or xenogenic tissue.

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23. The method of claim 18 wherein one of said plural distinct tissues is an avascular tissue.

24. A method for repairing in vivo articular cartilage on the surface of a bone, the method comprising the step of:

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providing to said bone surface at a locus in a mammal a device comprising an osteogenic protein disposed on the surface of a biocompatible, bioresorbable matrix, said matrix comprising residues specific for, or derived from, cartilage, and defining a structure which allows the attachment of infiltrating cells.

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25. The method of claim 24 wherein said locus occurs in a synovial cavity.

26. A method for restoring in a mammal a non-mineralized tissue in a skeletal joint, the method comprising the step of:

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providing to said skeletal joint in a mammal a device comprising an osteogenic protein disposed on the surface of a biocompatible, bioresorbable matrix,

said matrix comprising residues specific for, or derived from, tissue corresponding in kind to said non-mineralized tissue to be replaced, and defining a structure which allows the attachment of infiltrating cells.

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27. The method of claim 26 wherein said non-mineralized tissue to be restored comprises avascular tissue.

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28. The method of claim 26 wherein said non-mineralized tissue to be restored is selected from the group consisting of articular cartilage, tendon, ligament, synovial capsule and synovial membrane tissue.

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29. The method of claim 24 or 26 wherein said matrix is derived from allogenic or xenogenic articular cartilage.

30. The method of claim 24 or 26 wherein said device comprises a moldable solid.

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31. The method of claim 24 or 26 wherein said device comprises a flexible sheet.

32. The method of claim 24 or 26 wherein said device comprises collagen, polymers comprising lactic acid, butyric glycolic acid or mixtures thereof; hydroxyapatite and combinations thereof.

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33. The method of claim 18, 24 or 26 wherein said osteogenic protein comprises homodimers or heterodimers of OP-1, OP-2, BMP2, BMP3, BMP4, BMP5, BMP6, OPX, or functional equivalents thereof.